

Haemolytic anemia (cuz there is increased reticulocytes)

1-WHAT IS THE EVIDENCE FOR HAEMOLYSIS?

Increased red cell breakdown leads to:

elevated serum bilirubin (unconjugated)

excess urinary urobilinogen (resulting from bilirubin breakdown in the intestine,

reduced plasma haptoglobin

raised serum lactic dehydrogenase (LDH).

2-Increased red cell production leads to:

reticulocytosis

erythroid hyperplasia of the bone marrow.

2-WHAT ARE THE CAUSES OF HAEMOLYTIC ANAEMIA?

Inherited

Red cell membrane defect

Hereditary spherocytosis

Haemoglobin abnormalities

Thalassaemia

Sickle cell disease

Metabolic defects

Glucose-6-phosphate dehydrogenase deficiency

Acquired

IMMUNE

Autoimmune

Warm

Cold.

Drug-induced

NON-IMMUNE

Mechanical

Microangiopathic haemolytic anaemia Valve prosthesis

MISCELLANEOUS

Infections, e.g. malaria, mycoplasma

generalized sepsis

Hypersplenism

Normal value

Hb	8 g/dl	13-17
Mcv	80 fl	76-96
Mchc	34	30 – 36
Wbc	$6 \times 10^3/L$	4-11
Plat	$400 \times 10^3/L$	150- 400

What is your diagnosis ?

Normocytic normochromic anemia

What are the causes?

- After acute hemorrhage
- Some hemolytic anemias
- Aplastic Anemias
- Endocrinopathies (, hypoadrenalism, hypogonadism
- Anemia of chronic disease (chronic infections, neoplasms, uremia

What is your treatment?

- The ideal treatment for anemia of chronic disease is to treat the chronic disease
- erythropoietin can be helpful in some circumstances

Normal value

Hb	8 g/dl	13-17
Mcv	80 fl	76-96
Mchc	33	30 – 36
WbC	$2 \times 10^3/\text{L}$	4-11
Plat	$80 \times 10^3/\text{L}$	150- 400
Retic	0.2%	0.2 – 2

What is your diagnosis ?

PANCYTOPENIA

CAUSES OF PANCYTOPENIA

Bone marrow failure

aplastic anaemia

Bone marrow infiltration

Acute leukaemia

Myeloma

Lymphoma

Carcinoma

Ineffective haematopoiesis

Megaloblastic anaemia

Peripheral destruction

Hypersplenism

Portal hypertension

Felty's syndrome

Malaria

Myelofibrosis

SLE

Normal value

Hb	8 g/dl	13-17
Mcv	110 fl	76-96
Mchc	34	30 – 36
Wbc	$3 \times 10^3/L$	4-11
Plat	$80 \times 10^3/L$	150- 400

What is your diagnosis ?

MEGALOBLASTIC ANAEMIA

What are the causes of megaloblastic anemia

- vitamin B12 or folate deficiency
- Alcoholism
- Liver disease
- Anemia of hypothyroidism

MANAGEMENT OF MEGALOBLASTIC ANAEMIA

-Where a patient with a severe megaloblastic anaemia is very ill and treatment must be started before vitamin B12 and red cell folate results are available

- always treat with both folic acid and vitamin B12.

-The use of folic acid alone in the presence of vitamin B12 deficiency may result in worsening of neurological defects

a-Vitamin B12 deficiency

-Vitamin B12 deficiency is treated with hydroxycobalamin 1000 µg i.m. in five doses 2 or 3 days apart followed by maintenance therapy of 1000 µg every 3 months for life.

b-Folate deficiency

Oral folic acid 5 mg daily for 3 weeks will treat acute deficiency and 5 mg once weekly is adequate maintenance therapy.

Normal value

Hb	8 g/dl	13-17
Mcv	68 fl	76-96
Mchc	27	30 – 36
Wbc	$6 \times 10^3/\text{L}$	4-11
Plat	$200 \times 10^3/\text{L}$	150- 400

What is your diagnosis ?

Microcytic hypochromic anemia

2-WHAT ARE THE CAUSES OF MICROCYTIC ANEMIA?

DISORDERS OF IRON METABOLISM

Iron-deficiency anemia:

DISORDERS OF PORPHYRIN AND HEME SYNTHESIS

Acquired sideroblastic anemias Idiopathic refractory sideroblastic anemia

(Lead poisoning)

Vitamine B6 deficiency

DISORDERS OF GLOBIN SYNTHESIS

Thalassemias,

2-WHAT IS YOUR T MANAGEMENT ?

-A- ORAL IRON THERAPY

INDICATION

-Initial therapy to correct iron deficiency anemia

-Ferrous iron salt

- for example, ferrous sulfate tablets, 325 mg three times a day, or ferrous gluconate tablets, 300 mg two or three times a day. And should be continued for 3-6 months

-Management of side effects

Gastrointestinal side effects are the most common and usually can be managed symptomatically by

- (1) giving iron with or immediately after meals
- (2) reducing the amount of iron in each dose
- (3) reducing the dose frequency to once daily

-Delayed-release preparations *are not useful since they release iron beyond the upper small intestine where it cannot be absorbed*

PARENTERAL IRON THERAPY

Indications

- Malabsorption of iron
- Intolerance of oral iron

Side effects

- Immediate, life-threatening anaphylactic reactions
- fever, urticaria, adenopathy, myalgias, and arthralgias

Local reactions with intramuscular iron (skin staining, muscle necrosis, phlebitis, and persistent pain at injection site)

-Iron-dextran is suitable for intramuscular as well as intravenous use. Intramuscular iron should be given by the 'Z' track technique to prevent staining of the skin at the injection site.

MENINGITIS

NORMAL

Cells (0.5)	1000 PMN	600 LYMPH	200 LYMPH
Glucose 48-85 mg/dl	20	20	60
Protein (15-45) Mg/dl	70	70	55

↓
Bacterial
Meningitis

↓
tuberculous
Meningitis

↓
viral
Meningitis

-in Bacterial meningitis the predominant cell is PMN ,the protein content is elevated, and sugar content are decreased

-in tuberculous meningitis meningitis the predominant cell is lymphocytes ,the protein content is elevated, and sugar content is decreased

-in viral meningitis the predominant cell is lymphocytes ,the protein content is normal, and sugar content is normal

Normal

PH	7.6	7.35 -7.45
PCO ₂	25 mmHg	35-45
pO ₂	100 mmHg	80-100
HCO ₃	25 meg/L	18-28

What is your diagnosis ?

Respiratory alkalosis

Definition

Respiratory alkalosis is a condition marked by low levels of carbon dioxide in the blood due to breathing excessively

Causes

Causes of the alveolar hyperventilation seen in respiratory alkalosis include:

- anxiety, hysteria and stress
- moving into high altitude areas, when the low atmospheric pressure of oxygen stimulates increased ventilation
- pyrexia in fever, which stimulates the respiratory centre in the brainstem

Symptoms

- alkalosis may disrupt calcium ion balance, and cause the symptoms of hypocalcaemia (such as tetany, peripheral paraesthesiae, and fainting) with no fall in total serum calcium levels.

Treatment

-Treatment is aimed at the condition that causes respiratory alkalosis.

-Breathing into a paper bag -- or using a mask that causes you to re-breathe carbon dioxide -- sometimes helps reduce symptoms

PH	7.6	7.35 -7.45
PCO2	45 mmHg	35-45
pO2	100 mmHg	80-100
HCO3	40 meg/L	18-28

What is your diagnosis ?

METABOLIC ALKALOSIS

- is a metabolic condition in which the pH of the blood is elevated above the normal range.

- This is usually the result of decreased hydrogen ion concentration, or due to increased bicarbonate concentrations.

Causes

Endocrine diseases

Primary hyperaldosteronism

Cushing syndrome:

Git cause

Loss of gastric secretions

Drugs

Ingestion of large doses of nonabsorbable antacids(eg, magnesium hydroxide)

Thiazide or loop diuretics

MANAGEMENT

- treat the underlying cause

-If alkalosis occurs with volume depletion, treat the alkalosis with an intravenous infusion of isotonic sodium chloride solution.

-If alkalosis occurs in the setting of edematous states (eg, congestive heart failure [CHF]), use potassium chloride to correct the alkalosis instead of sodium chloride to avoid volume overload.

-If diuresis is needed, a carbonic anhydrase inhibitor (eg, acetazolamide)

-If there are clinical complications (coma, arrhythmias) or alkalosis is severe (>7.5), give intravenous HCl.

-Dialysis: Both peritoneal dialysis and hemodialysis can be used

PH	7.2	7.35 -7.45
PCO2	80 mmHg	35-45
pO2	50 mmHg	80-100
HCO3	30 meg/L	18-28

What is your diagnosis ?

RESPIRATORY ACIDOSIS

- is acidosis due to decreased ventilation of the pulmonary alveoli, leading to elevated arterial carbon dioxide concentration ($PaCO_2$).

Hypercapnia and respiratory acidosis occur when impairment in ventilation occurs and the removal of CO_2 by the lungs is less than the production of CO_2 in the tissues.

Types of respiratory acidosis

Respiratory acidosis can be acute or chronic.

In acute respiratory acidosis, the $PaCO_2$ is elevated above the upper limit of the reference range (over 6.3 kPa or 47 mm Hg) with an accompanying acidemia (pH <7.35).

In chronic respiratory acidosis, the $PaCO_2$ is elevated above the upper limit of the reference range, with a normal blood pH (7.35 to 7.45) or near-normal pH secondary to renal compensation and an elevated serum bicarbonate (HCO_3^- >30 mm Hg).

Causes

ACUTE

- depression of the central respiratory center
- inability to ventilate adequately due to neuromuscular disease (eg, myasthenia gravis, Guillain-Barré syndrome, muscular dystrophy),
- airway obstruction related to asthma or chronic obstructive pulmonary disease (COPD) exacerbation.

CHRONIC

COPD.

neuromuscular disorders, and severe restrictive thoracic deformities.

Normal

PH	7	7.35 -7.45
PCO ₂	25 mmHg	35-45
pO ₂	95 mmHg	80-100
HCO ₃	10 meg/L	18-28

What is your diagnosis ?

METABOLIC ACIDOSIS

what is metabolic acidosis ?

- is a process which if unchecked leads to acidemia (i.e. blood pH is low (less than 7.35) due to increased production of H^+ by the body or the inability of the body to form bicarbonate (HCO_3^-) in the kidney.

types and Classifications

-To distinguish between the main types of metabolic acidosis, a clinical tool called the anion gap is considered very useful.

-It is calculated by subtracting the chloride and bicarbonate levels from the sodium.

$$\text{Anion gap} = ([Na^+]) - ([Cl^-] + [HCO_3^-])$$

-As sodium is the main extracellular cation, and chloride and bicarbonate are the main anions, the result should reflect the remaining anions.

-Normally, this concentration is about 8-16 mmol/l (12 ± 4)

Increased anion gap

Causes include:

- lactic acidosis
- ketoacidosis
- chronic renal failure
- intoxication:
 - organic acids (salicylates, ethanol, methanol,
 - metformin)

Normal anion gap

Causes include:

- longstanding diarrhea (bicarbonate loss)
- Renal tubular acidosis (RTA)
- intoxication:
 - acetazolamide (Diamox)
- renal failure (occasionally)

what are the symptoms ?

-Symptoms may include chest pain, palpitations, headache, altered mental status,

- nausea, vomiting, abdominal pain, muscle weakness and bone pains.

-Those in metabolic acidosis may exhibit deep, rapid breathing called Kussmaul respirations

Treatment??

-A pH under 7.1 is an emergency, due to the risk of cardiac arrhythmias, and may warrant treatment with intravenous bicarbonate.

- Bicarbonate is given at 50-100 mmol at a time WITH monitoring of the arterial blood gas readings.

-If the acidosis is particularly severe and/or there may be intoxication, dialysis may clear both the intoxication and the acidosis.

Liver function test

	Normal value
Total bilirubine:	0.3-1.0 mg/dL
Conjugated (direct)	0.0-0.2 mg/Dl
Aspartate aminotransferase (AST)	15-40 U/L
Alanin aminotransferase (ALT)	15-40 U/L
Alkaline phosphatase	40-120 U/L

DIABETIC KETOACIDOSIS

Blood sugar 500 mg /dL

Urine ketonen +++

PH 7.01

PCO2 17 mmHg

pO2 90 mmhg

HCO3 5meg/L

		Normal value
Urea	100 mg /dl	20-40 mg /dl
Createnine	2 mg/dl	0.8-1.2 mg/dl
Calcium	15 mg/dl	8-11 mg/dl

What is your diagnosis ?

Chronic renal failure

-Chronic renal failure (CRF) is a slowly progressive and irreversible reduction in glomerular filtration rate (GFR).

a classification of the stages of CKD, as follows:

- Stage 1: Kidney damage with normal or increased GFR (>90 mL/min/1.73 m²)
- Stage 2: Mild reduction in GFR (60-89 mL/min/1.73 m²)
- Stage 3: Moderate reduction in GFR (30-59 mL/min/1.73 m²)
- Stage 4: Severe reduction in GFR (15-29 mL/min/1.73 m²)
- Stage 5: Kidney failure (GFR <15 mL/min/1.73 m² or dialysis)

MANAGEMENT

When one reaches stage 4, 5 CKD, renal replacement therapy is indicated,

Control of blood pressure

- Various target blood pressures have been suggested: for example, 130/85 mmHg for CRF alone, *lowered to 125/75 mmHg for those with proteinuria > 1 g/day.*

-ACE inhibitors have been shown to be more effective at retarding the progression of renal failure than other therapies.

Anaemia

-Recombinant human erythropoietin is effective in correcting the anaemia of CRF. The target haemoglobin is usually between 10.0 and 12.0 g/dl.

Fluid and electrolyte balance

Due to the reduced ability of the failing kidney to concentrate the urine, a relatively high urine volume is needed to excrete products of metabolism and *a fluid intake of around 3 litres/day is desirable.*

- Acidosis

-Declining renal function is associated with metabolic acidosis, which is often asymptomatic.

-The *plasma bicarbonate should be maintained above 22 mmol/l* by giving sodium supplements. bicarbonate

Lipid disturbances (give statine)